

REMARKS/ARGUMENTS

Reconsideration of this application is requested. Claims 1-17 are in the case.

I. SPECIFICATION

The specification has been objected to as not providing proper antecedent basis for claimed subject matter. In response, the specification has been amended to incorporate the subject matter as quoted in paragraphs 1-7 on pages 2 and 3 of the Action. The Examiner's assistance in this regard is appreciated.

II. CLAIM OBJECTIONS

Claims 16 and 17 have been objected to as having improper dependencies. In response, the dependencies of claims 16 and 17 have been amended to each refer to claim 15 rather than claim 14. Withdrawal of the claim objections is now respectfully requested.

III. THE OBVIOUSNESS REJECTION

Claims 1-17 stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over U.S. Patent 4,585,481 to Gupta et al. That rejection is respectfully traversed.

The invention as claimed is directed to a method of stabilizing adherence of a ceramic layer to a bond coat of a TBC system. The method comprises incorporating silicon into the bond coat and maintaining cobalt present in the bond coat at a level of 0-5 wt%.

Gupta is acknowledged at page 2 of the present application and relates to MCrAlY-type overlay coating compositions (where M is nickel or cobalt) for protecting superalloys at elevated temperatures. Silicon and hafnium may be added (see Abstract). However, due to the difference between TBC coating spallation, with which the present case is concerned, and overlay coating oxidation referred to in Gupta, an overlay coating with oxidation resistance does not necessarily lead to a good TBC spallation life when used as TBC bond coat.

It is interesting to note that three years later, Vine et al. (US patent 4,861,618 – acknowledged at paragraph [0006] of the present application) describes a NiCoCrAlY bond coat to improve TBC spallation life. The Vine coating contains 15-40% Co, 10-40%Cr, 5-15%Al, 0-2%Hf, 0-7%Si, 0.01-1.0%Y. The Vine approach is based on improvement of TBC coating. The major difference between Vine and the present invention is the limitation of Co in the present invention. It has been found according to the present invention that Co increases thermal expansion coefficient of the coating, and therefore reduces adhesion of the bond coat and ceramic TBC top coat. The thermal expansion coefficient increase of MCrAlY coating is not important for an overlay coating, and sometimes can be beneficial because it produces compressive stresses on the overlay coating itself. However, it is critical to TBC coating life. This phenomenon was not recognized by Gupta and Vine.

The work described in the present case (see Figure 1) demonstrates that there is a deleterious effect on TBC spallation life when the level of cobalt increases above about 5 wt% in MCrAlY-base bond coats. Experimentation described in the present specification indicates that TBC spallation life with the identified chemistry range

increases by about 30%, which can be translated to an improvement of about 40 degrees F in the operating temperature of gas turbine components. One of ordinary skill would not therefore have expected, based on Gupta, to achieve a stabilization of the adherence of a ceramic layer to a bond coat of a TBC system by incorporating silicon into the bond coat and maintaining cobalt present in the bond coat at level of 0-5 wt%.

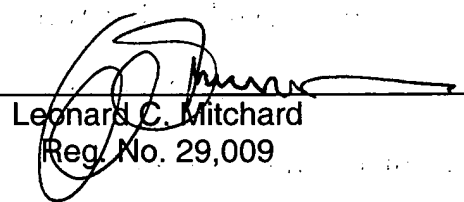
In light of the above, it is clear that the skilled artisan would not have been motivated to arrive at the presently claimed invention based on the Gupta disclosure. Absent any such motivation, a *prima facie* case of obviousness has not been generated in this case. Reconsideration and withdrawal of the outstanding obviousness rejection are accordingly respectfully requested.

Favorable action on this application is awaited.

Respectfully submitted,

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